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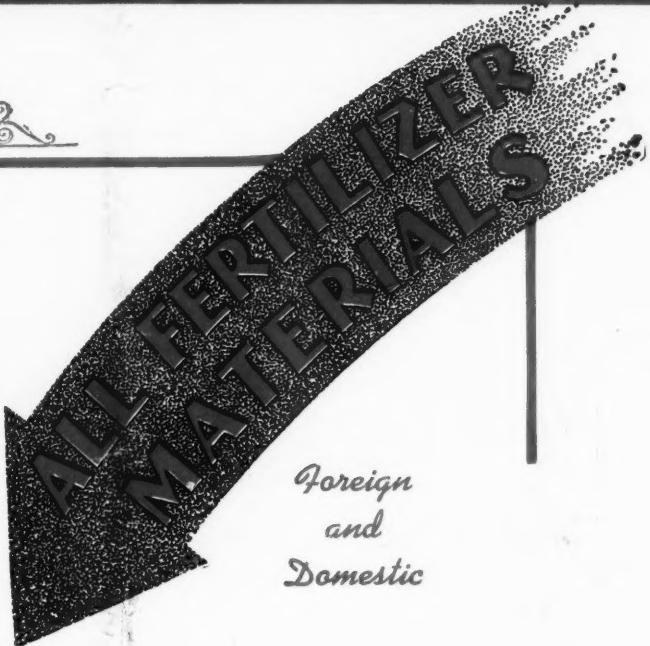


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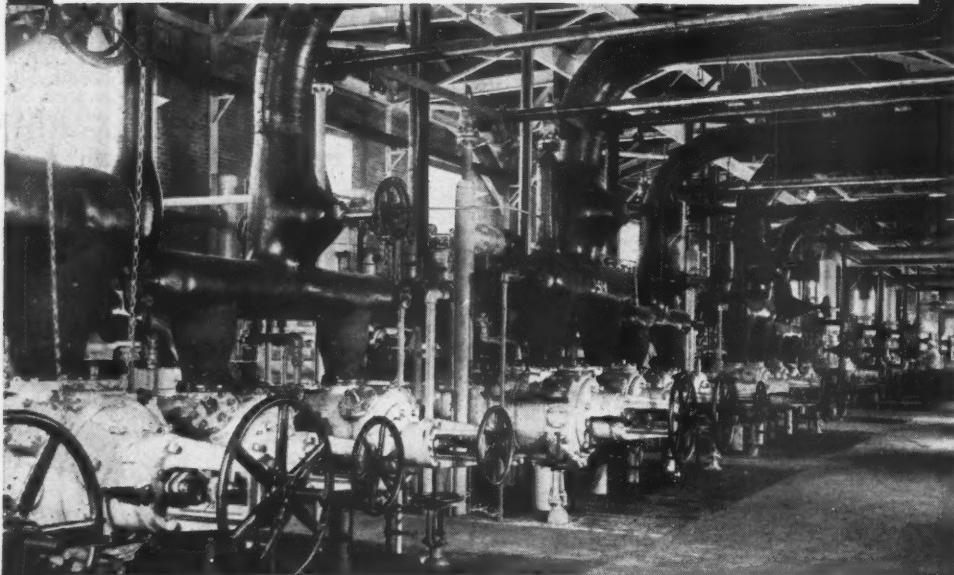
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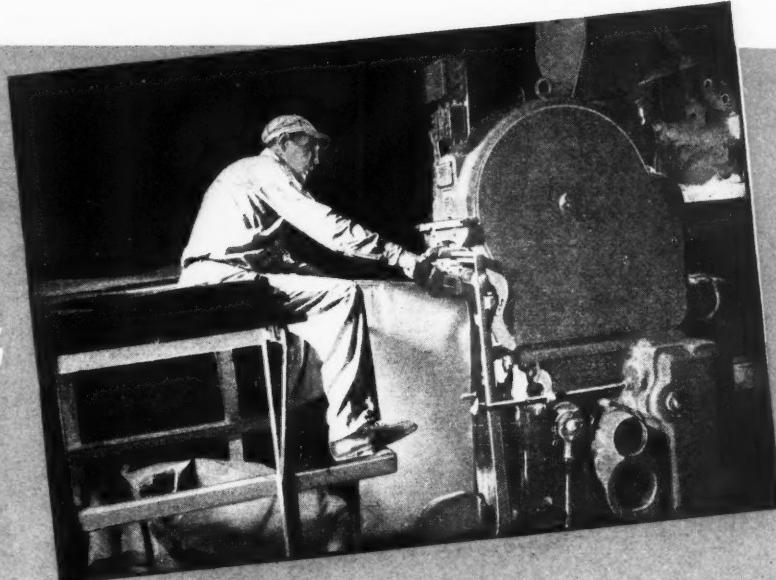
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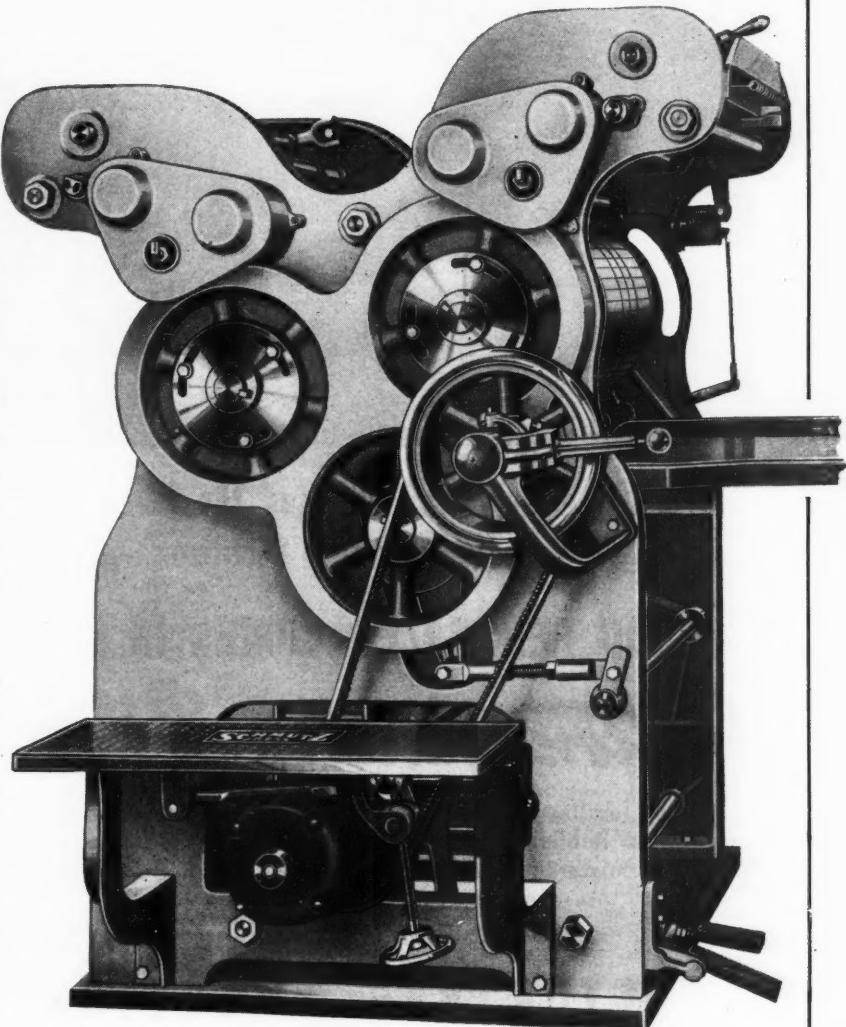
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The American FERTILIZER

Vol. 107

OCTOBER 4, 1947

No. 7

Symposium on Calcium in Agriculture

Fertilizer Chemistry Division of the American Chemical Society Devotes One Day's Program to Discussion of Important Branch of Agricultural Sciences

AT THE annual meeting of the American Chemical Society held in New York on September 15-19, 1947, the Division of Fertilizer Chemistry devoted the entire program of September 16th to a symposium of calcium in agriculture. Dr. Jackson B. Hester, Soil Technologist of the Campbell Soup Company, Riverton, N. J., and secretary of the division, presided.

In his introductory remarks, Dr. Hester pointed out that calcium is essential to the growth and development of green plants and the higher forms of animals. Moreover, it is a carrier or a conditioner of many other essential plant nutrients. Again, it acts to condition the soil favorably for plant growth. This symposium is designed to bring up to date the available information on calcium as a nutrient, as a conditioner for fertilizer, and a constituent of soils. Furthermore, it is hoped that the weaknesses of the information now available will be established in such a way as to point the needs of future research in a direction to supply the answers to the pertinent questions.

The following are abstracts of the 11 papers presented at the symposium:

Lime in Relation to Availability of Plant Nutrients

Emil Truog, University of Wisconsin, College of Agriculture, Madison, Wis.

In agricultural considerations, the word lime has reference to the carbonate, hydroxide, and oxide of calcium, and to a lesser

degree magnesium. Lime is added to soils for three purposes: (1) neutralizing acidity—that is, raising the pH of the soil, (2) supplying the elements calcium and magnesium as nutrients for plant growth, and (3) improving the physical condition of soils by providing a high level of exchangeable divalent cations which tend to coagulate the colloids. The paper deals primarily with the first purpose because it is largely through the effect on soil reaction that lime exerts its influence on the availability of plant nutrients.

Since reaction is the greatest single factor that influences the availability of plant nutrients, it is apparent that the regulation of reaction in areas of acid soils through the use of lime is of tremendous importance. If liming of acid soils had no other effect than the increased supply of readily available phosphorus which it promotes, it would in most cases be profitable to apply the lime.

All of the nutrient elements obtained by plants from the soil are influenced to some extent as regards availability by the level of lime present. When the levels of exchangeable and carbonate forms of calcium and magnesium are too high, availability is in some cases effected adversely. The reasons for both the favorable and unfavorable influence of lime on this availability have been greatly clarified in recent years, and a discussion of these matters is presented, along with a chart which illustrates the general trend of the relation of reaction and accompanying conditions to the availability of plant nutrient elements.

Calcium in Fertilizers

*A. L. Mehring, Division of Soils, Fertilizers, and Irrigation,
Bureau of Plant Industry, Soils, and Agricultural Engineering,
Beltsville, Md.*

Calcium is present in nearly all mixed fertilizers in substantial amounts. On the average fertilizers supply to the soil more calcium than any other nutrient element. The principal fertilizer materials supplying calcium are superphosphate, double superphosphate, dolomite, calcium cyanamide, gypsum, and ammonium nitrate—limestone mixtures.

Calculations indicate that mixed fertilizers in 1945 contained about 16 per cent CaO. An analysis was made of 378 determinations of CaO on various mixed fertilizers reported in the literature. This indicates that mixed fertilizers of today supply about the same quantity of CaO per ton as they did 10 or 50 years ago. The CaO content of a mixed fertilizer is related to the P₂O₅ content. A mathematical expression of the relationship has been formulated as follows: $y = 8.3285 + 1.1965x - 0.0464x^2$; where y is the CaO and x the P₂O₅ content.

In 1900, all fertilizers supplied 486,000 tons of CaO to the soil as compared with 417,000 tons from liming materials. In 1945, fertilizers supplied 2,531,000 tons and soil amendments 9,316,000 tons of CaO to agriculture.

Differential Effects of Various Calcium Carriers upon Transitions in Phosphatic Mixtures

W. H. MacIntire, W. M. Shaw, L. J. Hardin, and S. H. Winterberg, University of Tennessee Agricultural Experiment Station

Findings through 30 years are briefed. Dry limestone and dolomite proved inert in mixtures with ammoniacal phosphates. As registered through carbon dioxide evolution, progressions in the neutralization of superphosphate in mixtures with limestone and dolomite showed up to 17 per cent loss in P₂O₅ availability in the limestone mixtures, and virtually none in those with dolomite. In multiple ratios of aqueous 24-hour suspensions of super and limestone evolutions of carbon dioxide registered complete transition to diCa and $\frac{1}{2}$ replacement of the third hydrogen, whereas the dolomite produced only diCa- and diMg phosphates. In dilute water systems, monocalcium phosphate reacted upon limestone and upon dolomite and generated dibasic forms, whereas the Ca-Mono was inert toward those solids when monoMg phosphate was included; in slurries, however, the jointly included monophosphates were

reactant upon both limestone and dolomite. In moist mixtures with dicalcium phosphate, limestone induced 60 per cent transitions to the tertiary and generated 9 percent of C. I., against 20 per cent transition and 0.4 per cent generation by dolomite, during 13 months.

In 10-ton mixtures of 2 of wetted limestone or dolomite (dry basis), with 1 of super setting was prevented and P₂O₅ reverions were held to minimum by reworkings, or by several daily up-endings of the immediately bagged mixtures. Calcium silicate immixes proved compatible with superphosphate and the liberated SiO₂ served as conditioner and as desiccant. Fluorine-free calcium silicate additions converted superphosphate slurries to workable solids, without detriment to P₂O₅ availability. In superphosphate mixtures with calcium silicate slag, quenched and unquenched, anhydrous diCa phosphate developed in the dry without detriment, but fluorophosphate formation was registered by the high C. I. that developed in moist mixtures. Powdery defluorinated rock phosphate induced C. I. mixtures with superphosphate, whereas fluorine-free fused tricalcium phosphate of low fluorine content did not.

In superphosphate mixtures, selectively calcined dolomite induced diCa phosphate, with residues of MgO, but it generated mono- and dimagnesium phosphates in aqueous systems and during analytical extractions procedures.

Although fresh mixtures of slag and superphosphate proved effective upon immediate incorporation, they suffered in effectiveness through decrease in P₂O₅ availability when allowed to age. Joint usage proved efficacious, however, when slagged soils were phosphated and gave results often superior to those from equivalent inputs of super and limestone. Calcium silicate invariably proved more effective than the carbonate, in super mixtures and in the soil. Calcium fluoride exerted no deleterious effect upon P₂O₅ availability in the soil and showed no nutrient value.

Chemical Soil Tests for Estimating the Readily-Available Calcium and the Need for Liming Soils

Michael Peech and Richard Bradford, Cornell University

The following chemical methods for the determination of the readily-available calcium supply and the lime needs of soils are reviewed: the determination of exchangeable calcium and the degree of calcium saturation; the determination of exchangeable hydrogen;

the rapid determination of the lime requirement of soils; the rapid microchemical soil test for the readily-available calcium supply of soils; and the determination of soil reaction (pH). The chemical methods for estimating the lime needs of soils are critically evaluated in light of the different reasons, which have been advanced, for liming acid soils.

Ionization of Calcium from Soil Colloids and Its Bearing on Soil-Plant Relationships

C. E. Marshall

Earlier analytical and electrometric pH data seemed to show that a given cation upon a given clay is held with bonding energy of fixed amount. Theoretical work on cation exchange has been based on this assumption. It is now examined in detail by the new membrane electrode technique by which the activities of single cations can be determined. Calcium and sodium are compared in their relationship to clays of the montmorillonite group and to kaolinite. Both cations can vary greatly in their bonding energy on a given clay, the changes being relatively abrupt for the montmorillonite clays. The case of calcium is of both theoretical and practical importance. In the montmorillonite clays calcium generally is characterized by a very small fraction active and over a considerable range of calcium additions it is taken up almost without ionization. Kaolinite on the other hand possesses a much greater fraction active which steadily increases with calcium additions. In the montmorillonite clays the ionization of monovalent ions like sodium and potassium averages about 20 times that of calcium. In kaolinite it is only 2 to 4 times the calcium. The bearing of these factors upon uptake by plants is then discussed.

The Influence of Calcium in the Soil upon the Availability of other Cations

J. L. Malcolm, S. J. Toth, and F. E. Bear

The influence of calcium in the soil upon the availability of soil potassium and magnesium, as presented in the literature, is critically reviewed and discussed. The effects of the anions associated with calcium, when added to soils that are acid, neutral, or alkaline, are elaborated as to their influence upon potassium availability. It is pointed out that in general, alkaline forms of calcium when added to acid soils decrease potassium availability, whereas neutral salts of calcium increase the amount of exchangeable potassium.

Special problems concerned with potassium availability on soils of high lime content are enumerated. The relationship between calcium-saturation of the soil complex and potassium availability is discussed critically.

The cation and anion compositions of plants are markedly altered by the addition of calcium to the soil. The reciprocal relationships between calcium and potassium are discussed from the viewpoint of the earlier evidences as to their mutual effects. The yield and calcium and potassium contents of various crops are discussed from this viewpoint.

Magnesium like potassium is influenced by the degree of calcium-saturation of the soil complex. Although the existence of the mutual inter-action of magnesium and calcium were recognized earlier than the Ca/K relationships, up to the present time, the latter has been more thoroughly investigated than the former. The effects of calcium additions upon the absorption of magnesium by cabbage, potatoes, tomatoes are reviewed critically.

The mutual relationships of cation pairs has generally been considered alone until recently. The interrelationship existing between calcium, potassium, magnesium, and sodium have been studied by Van Itallie and others. Equations to calculate the relative availability of calcium, magnesium, sodium and potassium according to Van Itallie are presented. The belief as to the existence of a cation constancy in plants is reviewed.

Properties That Influence the Availability of Calcium in the Soil to Plants

H. P. Cooper, W. R. Paden, W. H. Garman, and N. R. Page

Calcium is one of the most active elements in the soil colloidal complexes. Much of the total calcium in the cation exchange complex of the soil is in readily replaceable form. The percentage of the calcium ions in the exchange complex of many humid soils varies inversely with the exchangeable hydrogen. The percentage of the total exchangeable ions in a Cecil sandy loam soil at four pH levels—5.0, 5.5, 6.0, and 6.5—was for calcium 8.39, 19.27, 28.62, and 34.67 per cent, respectively, and for hydrogen 70.72, 56.01, 44.41, and 36.85 per cent, respectively.

Since there is not a close correlation between the concentration of exchangeable cations in soil colloidal complexes and the quantity of ions absorbed by some plants, it is desirable to consider some of the properties of ions which may influence their availability to plants. Such properties as standard elec-

(Continued on page 26)

Control Officials To Hold Annual Convention

The first annual convention of the Association of American Fertilizer Control Officials will be held at the Shoreham Hotel, Washington, D. C., on the afternoon and evening of October 21, 1947. The afternoon session, starting at two o'clock, will be opened by President D. S. Coltrane, of Raleigh, N. C. The subjects and speakers for this meeting will be as follows:

"Our Mutual Opportunities and Responsibilities," J. R. Taylor, Agronomist, American Plant Food Council, Washington, D. C.

"Changing Pattern of Fertilizer Use," M. H. Lockwood, President, National Fertilizer Association, Washington, D. C.

"The Fertilizer Outlook for 1947-1948," W. A. Minor, Assistant to the Secretary of Agriculture.

Control Problems Associated with New Materials and Methods of Distributing Fertilizer to the Farm:

- (a) "Liquid Fertilizers Including Liquid Phosphoric Acid," Allen B. Lemmon, Sacramento, Calif.
- (b) "Anhydrous Ammonia and Nitrogen Solutions," R. A. Maddox, Jackson, Miss.
- (c) "Bulk Distribution," Stacey Randle, New Brunswick, N. J.

The subjects and speakers for the evening session at 8 o'clock will be:

Secondary and Minor Plant Foods:

(a) "The Growing Importance and Need for Control," F. E. Bear, New Brunswick, N. J.

(b) "Labeling for Secondary Plant Foods," E. W. Constable, Raleigh, N. C.

(c) "Labeling for Minor Plant Foods," J. J. Taylor, Tallahassee, Fla.

"TVA Fused Ca and Ca-Mg Phosphates," W. H. MacIntire, Knoxville, Tenn.

"Other New Phosphates," W. L. Hill, Fertilizer Division, U. S. D. A.

"Control Problems in the Fertilizer Industry," S. F. Thornton, Royster Guano Company, Norfolk, Va.

"The Fertilizer Inspector — Inspectors' Equipment," B. D. Cloaninger, Clemson, S. C.

Control Problems of Liming Materials:

(a) "Labeling, Enforcement, Penalties," T. F. Hoffman, Richmond, Va.

(b) "Particle Size," E. R. Collins, Raleigh, N. C.

"The Use of Fertilizer Tonnage Data," J. F. Fudge, College Station, Texas

"Fertilizer Publications," Bruce Poundstone, Lexington, Ky.

Round Table Discussion, Pertinent Control Problems:

- (1) Guarantees for Fused Phosphatic Materials
- (2) Method of Guaranteeing Minor Elements
- (3) Labeling of Specialty Goods
- (4) Boron

At the close of the meeting, officers for the ensuing year will be elected. The present officers are: President, D. S. Coltrane, Raleigh, N. C.; Vice-President, Allen B. Lemmon, Sacramento, Calif.; Secretary and Treasurer, Henry R. Walls, College Park, Md.

An invitation is extended to all members of the fertilizer industry to attend these meetings and join in the discussion.

Thompson Appointed to Ohio Feed and Fertilizer Department

Announcement has been made by Frank N. Farnsworth, Director of the Ohio Department of Agriculture, of the appointment of Wenzel S. Thompson, of Bowling Green, Ohio, as Specialist in Charge of Feeds and Fertilizers in the Division of Plant Industry. He assumed his new duties on September 16th.

Mr. Thompson served as Chemist in Charge of Division of Plant Industry Agricultural Laboratories at 87 N. Fourth St., Columbus, Ohio, during 1944-46, inclusive. He resigned such position the first of last January to accept a position as Director of Research for Central Mills, Dunbridge, Ohio, producers of dehydrated alfalfa meal. He now returns to a service with which he is thoroughly familiar and experienced. He is widely and favorably known among livestock and poultry feed manufacturers throughout Ohio and the Midwest.

The appointee is a graduate of the University of Wisconsin, specializing in biochemistry. He was employed for several years by the Wisconsin Department of Agriculture in their feed and fertilizer control service during the time methods for the assay of vitamins in livestock feeds were being perfected there.

Fertilizers on Sugar Cane in Mississippi

Bulletin 446 of the Mississippi Agricultural Experiment Station recently issued gives results of 10 fertilizer tests on sugar cane conducted at 3 locations during the period of 1941-1946.

The joint authors are I. E. Stokes and T. E. Ashley who state that the tests were designed to determine the general influence of nitrogen mixtures, and methods of application on yields of cane and sirup rather than a critical evaluation of specific fertilizer practices. However, they state, the data furnish some practical information related to the fertilization of sugar cane under certain soil and climatic conditions in Mississippi.

The summary of tests given in the bulletin is as follows:

Summary

1. Inorganic sources of nitrogen (cyanamide, nitrate of soda, and ammonium sulphate) were equally as satisfactory as cottonseed meal in the total production of a good quality of sirup per acre.

2. Applications of nitrogen, usually from 20 to 60 pounds per acre, improved the yields of cane and sirup per acre in essentially all tests; the response depending largely upon the soil type and general fertility of the land. In some of the tests, applications of nitrogen higher than the 60 pounds per acre had a detrimental effect on yield of sirup per ton of cane and on yield of sirup per acre.

Applications of 100 pounds of P_2O_5 per acre as compared to no phosphate on Susquehanna soil (sandy phase) generally improved the yield of cane and sirup per acre. In other tests on that and on the other soils, increasing the quantity of P_2O_5 from 40 to 80 or from 64 to 128 pounds per acre resulted in an increase in yields in some instances and no increase in other instances. The more favorable effect of applying P_2O_5 was in the case of stubble crops.

3. Fertilizer applied in one application in March was as effective as when the same quantity was applied in two applications, one in March and one in June, in most of the tests. Two applications gave better results in some of the second year stubble tests.

4. Because of the widely varying soil types and soil fertility throughout the sugar cane growing area of Mississippi, it is not feasible to recommend kinds and quantities of fertilizer which will prove most suitable under all

conditions. In general, based on the results from tests conducted at Meridian, Laurel, and Poplarville, a mixed fertilizer high in nitrogen such as a 6-8-4 (N, P_2O_5 , K_2O) should be applied at the rate of from 400 to 800 pounds per acre, depending upon the soil type and previous crop history of the land. Light sandy soils low in fertility require, in addition to the mixed fertilizer, a supplemental application of from 20 to 30 pounds of nitrogen per acre.

Du Pont Ammonia Promotes Squires

Lombard Squires has been appointed assistant production manager of the ammonia department of E. I. du Pont de Nemours & Company, Wilmington, Del. He has been manager of the technical section of the Belle, W. Va., works. Mr. Squires will be transferred to the Wilmington offices where he will have charge of technical development work in the production division. James B. Tinker, who has been assistant manager of the technical section at the Belle works, is succeeding Mr. Squires there.

Mr. Squires became a chemical engineer in the du Pont experimental station in Wilmington in 1938. For four years he worked in the chemical division of the ammonia department, and was then transferred to the explosives department as a technical specialist in military production. He has been technical manager at Belle since March, 1946.

European Superphosphate Meeting

A series of technical meetings for chemists and technicians of the superphosphate industry was held under the auspices of the International Superphosphate Manufacturers' Association at Landskrona, Sweden, and Kalundborg, Denmark, between September 2nd and 4th.

Technical men from 14 countries attended, and papers were read and discussed on such subjects as "Optimum Acidulation," "The Theory of the Lead Chamber Process," "Plant Problems in Connection with Granulation," and "Field Experiments with Granulated Superphosphate."

The delegates also visited the Superphosphate Works at Landskrona and Kalundborg and were entertained by the Swedish superphosphate manufacturers and the Danish superphosphate manufacturers.

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Vol. 107

OCTOBER 4, 1947

No. 7

Principal Articles in This Issue

	PAGE
SYMPOSIUM ON CALCIUM IN AGRICULTURE.....	7
Control Officials to Hold Annual Convention.....	10
Thompson Appointed to Ohio Feed and Fertilizer Department.....	10
Fertilizers on Sugar Cane in Mississippi.....	11
Food Demands and Fertilizers.....	12
Virginia-Carolina Annual Report.....	13
Obituary—George A. Whiting.....	13
August Tag Sales.....	14
FERTILIZER MATERIALS MARKET	
New York.....	15
Philadelphia.....	16
Charleston.....	16
Chicago.....	18
Ohio Farmers Set Record in Buying Fertilizer.....	22

Food Demands and Fertilizers

Food shortage and world-wide hunger continue to plague humanity. The obligation to produce foods in abundance continues. To continue maximum production requires plant food not only to meet world needs but as a means of producing crops most economically.

Whether farm products are selling at high or low prices, farm profits will depend largely on the cost per unit of production. It costs as much to prepare, seed and cultivate poor-yielding lands as it does for high-yielding lands. Therefore, the greater the yield, per acre, the less will be the labor cost per bushel, bale, or other unit of crops produced.

Getting maximum yields, of course, involves several factors such as good preparation of the soil, planting good varieties of high-yielding, disease-resistant seed, proper fertilization and cultivation, and, of course, a good season.

Of these, proper fertilization is fundamental. If a crop is well fed the seed has its best opportunity to yield. Well-fed plants have greater resistance to disease, and if attacked by insects have more fruit left after the insects have taken their toll. Even drouth is withstood better by well-fertilized crops because their extended root systems reach out to draw more widely on soil moisture.

Proper fertilization, in a word, means the use of the kind and quantity of fertilizers that will bring the farmer the greatest returns.

Farmers fear deflation and the consequent lowering of the prices of their products, a fear that makes them conservative about costs. Yet he would be unwise to cut down on any means for securing high yields per acre for it is the yield per acre that will determine the amount of the farmer's profit after costs are deducted.

Fertilizers provide means for economically producing high yields, thereby serving as a buffer against extreme losses from falling prices, and they are the only means of countering the high cost of farm labor in crop production.

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COMMUNITY CHEST

A. O. A. C. Annual Meeting

The 61st annual convention of the Association of Official Agricultural Chemists will be held in Washington, D. C., on October 20, 21 and 22, 1947. The sessions will be held at the Shoreham Hotel, 2500 Calvert Street, N. W. Included in the program is a report of the Committee on Fertilizers relative to changes in definition of some fertilizer materials and the addition of new materials to the official list.

Chase Appoints Stevens as Buffalo Sales Manager

The appointment of R. J. Stevens to the post of Sales Manager of Chase Bag Company's Buffalo branch has been announced by Paul Ullmann, Buffalo branch manager.

Mr. Stevens, a former Air Force Captain who served in the South Pacific Theatre of War, will assume the duties of sales manager after having served the company's Buffalo branch for three years as a sales representative

Virginia-Carolina Annual Report

In his report to the stockholders of the Virginia-Carolina Chemical Corporation, President A. Lynn Ivey announced that production and sales for the year were at record levels in all departments and divisions. Consolidated net sales were \$42,410,182.56 as compared with \$36,604,025.79 for the previous year. Net earnings for the year, after provisions for Federal and State taxes on income, were \$4,067,074.20 as compared with \$1,702,598.77 for the previous year.

During the past two years, large sums have been expended for capital additions, the major items being the acquisition and enlargement of the Florida phosphate mining properties, the rate of production of which has been trebled since they acquired them; the erection of a modern fertilizer plant at Dubuque, Iowa, which has just begun operations; the enlargement of several fertilizer plants, and the further mechanization of production facilities generally. A new building to house the main offices of the company in Richmond is now under construction.

At the annual meeting of stockholders held on September 26th, the members of the Board of Directors were all re-elected for another year. At its organization meeting, the

Board elected the following officers: A. Lynn Ivey, President; Joseph A. Howell, Executive Vice-President; Edward Ryland, Vice-President; Irving D. Dawes, Vice-President and Treasurer; George G. Osborne, Secretary and Assistant Counsel; Leslie W. Dunn, Assistant Treasurer; Curtis B. Alderman, Assistant Secretary; and Edgerton E. Franck, Auditor.

Extra Nitrogen on Oats Brings Big Returns

A member of the Greene County, Missouri, balanced farming ring, J. L. Johnston, reports a 100-bushel oats yield. On a 19½ acre field he used 300 pounds of 4-12-4 fertilizer and seeded the oats at a rate of three bushels per acre. Fertilizer cost was \$5.10 per acre. But Karl Wickstrom, assistant county agent, suggested that he also add 100 pounds of ammonium nitrate per acre. Johnston did this on about half of the field. The half receiving only the 4-12-4 fertilizer yielded 65 bushels of oats per acre. But the portion of the field getting both fertilizer and ammonium nitrate produced 100 bushel oats. According to prices offered Johnston for his oats, he got back \$26.50 increase for the extra \$3 per acre invested in ammonium nitrate.

Obituary

George A. Whiting

The fertilizer industry has lost another of its pioneer members in the sudden death on September 7th of George A. Whiting, founder and president of the Standard Wholesale Phosphate and Acid Works, Baltimore, Md. Mr. Whiting had gone to the Bon Secours Hospital for a general check-up when a heart condition developed which carried him off.

Mr. Whiting started the company 41 years ago and built it up to one of the leading fertilizer plants in the Eastern territory, operating the largest single sulphuric acid plant in the country. A new 500-ton addition to the acid plant is now under construction. No successor to Mr. Whiting as president has been selected but operations are continuing under the other company officers.

In addition to his business interests, he was a director of the National Marine Bank of Baltimore and was widely known as an enthusiastic yachtsman, whose craft had won a number of the major yachting trophies.

August Tag Sales

Sales of fertilizer tax tags in 16 States during August, as in July, were greater than for the same month in recent years. Reports of State control officials to The National Fertilizer Association reveal that tag sales in the 16 reporting States amounted to 434,000 equivalent short tons. Compared with the previous August, sales increased 18 per cent, and compared with August, 1945, sales increased 44 per cent. The August average for the years 1935-1939 was 140,000 short tons, so sales this August were 210 per cent greater.

In the 11 Southern States, sales were equivalent to 278,000 tons; this represented an increase of 23 per cent over the 223,000 tons reported for last August and 59 per cent

over August, 1945. Compared with the 1935-1939 August average of 45,000 tons, sales were more than 6 times greater. For the individual States, August sales for 9 of them were higher than for a year ago, with Oklahoma registering the greatest percentage increase; of the two States where sales decreased, Virginia and Arkansas, the decline in August sales in Arkansas was more pronounced.

August sales in the 5 Midwestern States, amounting to 156,000 equivalent short tons, were 8 per cent above the 144,000 tons reported for a year ago, 23 per cent above August, 1945, and 64 per cent above the 1935-1939 August average of 95,000. Sales this August in 3 of the 5 States, In-

(Continued on page 28)

FERTILIZER TAX TAG SALES

COMPILED BY THE NATIONAL FERTILIZER ASSOCIATION

STATE	AUGUST			JANUARY-AUGUST			
	1947 TONS	1946 TONS	1945 TONS	% OF 1946	1947 TONS	1946 TONS	1945 TONS
Virginia.....	50,671	54,921	50,020	99	508,000	508,916	464,634
N. Carolina.....	40,404	32,546	15,840	97	1,202,391	1,238,132	1,170,972
S. Carolina.....	24,348	17,960	10,790	94	648,549	692,521	677,255
Georgia.....	3,950	13,794	14,445	99	929,173	932,742	907,773
Florida.....	48,999	46,351	44,129	84	516,593	618,077	530,648
Alabama.....	13,300	11,150	15,000	84	600,450	711,650	632,800
Tennessee.....	33,030	25,994	14,450	104	283,174	272,419	242,185
Arkansas.....	1,687	6,700	2,000	102	135,517	132,800	108,400
Louisiana.....	4,338	2,005	3,050	95	131,818	138,618	132,436
Texas.....	20,192	8,904	3,500	111	250,055	225,705	153,285
Oklahoma.....	9,500	2,950	1,950	160	57,292	35,748	18,362
<i>Total South.....</i>	<i>278,419</i>	<i>223,275</i>	<i>175,174</i>	<i>96</i>	<i>5,263,012</i>	<i>5,507,328</i>	<i>5,38 750</i>
Indiana.....	63,278	61,207	44,423	110	492,346	447,865	347,617
Illinois.....	25,200	37,400	25,400	118	267,375	225,883	178,939
Kentucky.....	26,250	19,705	9,188	114	297,592	260,666	236,821
Missouri.....	16,550	18,740	40,183	97	186,736	193,211	134,966
Kansas.....	24,275	6,858	7,300	214	85,823	40,085	31,305
<i>Total Midwest.....</i>	<i>155,553</i>	<i>143,910</i>	<i>126,494</i>	<i>114</i>	<i>1,329,872</i>	<i>1,167,710</i>	<i>929,648</i>
<i>Grand Total.....</i>	<i>433,972</i>	<i>367,185</i>	<i>301,668</i>	<i>99</i>	<i>6,592,884</i>	<i>6,675,038</i>	<i>5,968,398</i>

FERTILIZER MATERIALS

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FOR CARLOADS OR SEASON'S REQUIREMENTS

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FERTILIZER MATERIALS MARKET

NEW YORK

Prices on Organic Materials Reach All-Time High Levels. Mixing Starting for Coming Season. About One-Tenth of Sulphate of Ammonia To Be Exported. Canadian Ammonium Nitrate Price Rises.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, October 1, 1947.

High grade organic materials took the spotlight of the local fertilizer materials market the past week with the feed trade actively bidding for such materials as tankage, blood, soybean and cottonseed meals and fishmeal. These materials which normally would go to the fertilizer trade are now being eagerly bought by feed buyers who have picked up practically all available supplies for quick shipment and have bid these materials up to a price level that probably is a new all-time high. Animal tankage sold freely at \$12.00 per unit of ammonia (\$14.59 per unit N); blood, \$10.00 per unit (\$12.16 per unit N); soybean meal, \$100.00 to \$105.00 per ton and cottonseed meal at about \$95.00 per ton, all f. o. b. Eastern shipping points. A very large percentage of the fish scrap produced this season has already been converted into fishmeal and shipped out to the feed mills, with very little going to the fertilizer trade on account of price. With the menhaden fishing season growing to a close, there is very little prospect of any more material being offered for sale this season.

This whole picture presents a problem to some manufacturers who use a high percentage of organic fertilizer materials in their mixtures. Some low grade organic materials are available but most buyers prefer the higher analysis materials. The supply of organics will definitely be on the short side this season unless some unforeseen change takes place.

Sulphate of Ammonia

Material is moving on contract and some of the small fertilizer manufacturers who are just starting to mix fertilizer for the new season are now ordering out their commitments. It is understood that about 9 per cent of the available supply has been earmarked by the government for export. Some

reports are heard that Cuba is very short of this material and has been cut down in their allotment.

Potash

Manufacturers are doing their best to supply the trade but the demand is still greater from all sections than the available supply. Some producers report difficulty in securing necessary freight cars to load the material.

Superphosphate

While shipments are reported moving along well on the Eastern Seaboard certain Southern buyers are reported as delaying shipments possibly due to the lateness of the crop season.

Ammonium Nitrate

The price of this material has just been advanced about \$7.50 per ton by the Canadian producers and there is an urgent demand for this material for quick shipment.

Bone Meal

Feed manufacturers have re-entered the market after a lapse of several months and have bought rather heavily, with the result that producers may advance their prices shortly. The fertilizer trade is actively buying for the spring season.

Castor Pomace

Very little of this material is coming on the market because the production is under last year and one producer was forced to close down for an extended period due to lack of raw material.

Nitrate of Soda

When available, this material is actively sought by buyers who are trying to make sure they have enough for their spring requirements. As fast as the imported material arrives at a port it is quickly shipped out.

PHILADELPHIA

Market Still Tight. Organic Ammoniates Make Big Jump in Price. Demand for All Materials Still Keeps at Levels Beyond Probable Production.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, September 29, 1947.

Active inquiry has developed for certain of the raw fertilizer materials which are now higher in price and in scant visible supply. The cost to the farmer this season is bound to be higher. The unsatisfactory box-car supply is also a disturbing factor.

Sulphate of Ammonia.—While production is up and shipments are moving along on contracts, there is still unsatisfied demand for additional quantities, and the price position is strong.

Nitrate of Soda.—Strong demand still continues for this article. Domestic production advanced in price \$5.00 per ton on October 1, 1947, but it will then still be \$5.00 to \$5.50 under the current Chilean price.

Ammonium Nitrate.—Canadian producers have advanced the price to \$70.25 in paper bags, f. o. b. producing works, which is considerably higher than the contract price in the United States. The demand is very brisk for this material and much ahead of the supply.

Castor Pomace.—There have been no free offerings although it is reported that some little sold at \$40.00 per ton, which is \$2.50 per ton above the previous price.

Blood, Tankage, Bone.—The blood and tankage market took a wild jump over last week-end, both shooting up to \$12.00 per unit of ammonia (\$14.59 per unit N). This advance, as one report put it, is equivalent to \$32.00 per ton on the blood, and \$15.00 on the tankage. Steamed bone was offered rather freely at \$58.00 to \$60.00 per ton. This sudden interest in organics was from the feeding trade.

Fish Scrap.—This market advanced in sympathy with other organics. Scrap was quoted at \$125.00 to \$130.00 per ton, and meal at as high as \$148.00.

Phosphate Rock.—Contract shipments are moving steadily but the demand continues strong. Greatly increased production facilities are in active progress.

Superphosphate.—The supply position is exceedingly tight, and production is restricted by the present scarcity of sulphuric acid.

Potash.—Requirements are still far ahead of the domestic capacity to supply, and it is reported that nothing is to be expected from France or Russia for some time.

CHARLESTON

Rise in Materials Prices Smaller Than in Other Commodities. Feed Organics at Higher Price Levels. Materials Supply Less Than Demand

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, September 30, 1947.

Costs of prime raw materials continue to move upward but this rise remains quite small in proportion to the rising costs of other commodities. Practically all prime ingredients continue short of demand but production is high generally.

Organics.—Interest in organics by the fertilizer market is rather quiet, but the feed market has run prices to higher levels. Prices may go higher if proposed freight increases go into effect. Little domestic nitrogenous is offered and the prices are from \$5.25 to \$6.50 per unit of ammonia (\$6.38 to \$7.90 per unit N) in bulk, f.o.b. works, depending on the producer. No unusual buying interest is reported on South American organics which remain higher than domestic buyers' views.

Castor Pomace.—No new offerings are reported as suppliers are hard pressed to satisfy contract commitments. Price is now around \$40.00 per ton, f.o.b. works in bags.



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Knoxville, Tenn.



**The Dinner Bell
is always ringing
for growing crops**

They are always hungry, forever feeding on the soil, taking food which must be replenished. As time goes on, more and more farmers are realizing that their crops cannot rotate profitably without the aid of a good commercial fertilizer.

**RAYMOND Multi-Wall PAPER
FERTILIZER SHIPPING SACKS**

... are keeping pace with the growing demand for fertilizer. CUSTOM BUILT in various types, sizes, and strengths, printed or plain, they give the producer, packer, and shipper of fertilizer a perfect shipping method. Tough, strong, and dependable, Raymond Shipping Sacks give the product complete protection from packer to user. Investigate Raymond Shipping Sacks today. They are available now for your requirements.

THE RAYMOND BAG COMPANY
Middletown, Ohio



Potash.—Demand continues to exceed supply. There is still no report of estimated importations. Prices are firm and unchanged from original producers.

Nitrate of Soda.—Demand increases as the season progresses and domestic nitrate, as of October 1st, will be increased by \$5.00 per ton.

Ammonium Nitrate.—The market is now established on Canadian nitrate at \$70.25 per ton, f.o.b. works in bags. This new price is the result of a recent increase of \$7.50 per ton due to higher manufacturing costs. Demand still exceeds supply. Domestic contract material costs \$48.50 per ton in bags, f.o.b. works.

Sulphate of Ammonia.—Market is firm and prices remain unchanged with demand still exceeding supply.

Dried Ground Blood.—This market has advanced, largely due to feeder interest and prices range from \$8.50 to \$10.00 per unit of ammonia (\$10.33 to \$12.16 per unit N) in bulk, f.o.b. production point.

Hoof Meal.—Very little of this material is being offered and last sales were at around \$7.25 to \$7.50 per unit of ammonia, (\$8.88 to \$9.12 per unit N), f.o.b. works.

Tankage.—This material is largely taken up by the feed market at around \$11.50 per unit of ammonia (\$13.98 per unit N) with some sellers asking \$12.00 (\$14.59 per unit N), making a new high in the price of this material.

Superphosphate.—Production in July was down, probably as a result of continued car shortage for hauling phosphate rock. The sulphuric acid situation remains tight also.

Phosphate Rock.—Market remains firm and demand strong. Deliveries have been hampered by difficulty of the producers to get sufficient box cars. The recent storm in Florida also affected production to some extent.

CHICAGO

Demand for Fertilizer Organics Continues with Supplies Problematical. Feed Material Prices Rise Considerably.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, September 29, 1947.
Prices of organic material in this territory were virtually unchanged though continued to show strength in the present tight market. Inquiry from the comparatively smaller mixers persists, while the larger mixers show no interest in the prevailing prices. If pro-

ducers obtain the raw material they hope for, there may be some slight tonnage of nitrogenous offered during the balance of the year.

It is reported that current supplies in the feed market are short of demand and that wet rendered tankage is now at around \$11.00 per unit ammonia (\$13.37 per unit N), f. o. b. shipping point, and dried unground blood in the neighborhood of \$10.50 per unit (\$12.76 per unit N), f. o. b. Midwest points.

Webster Joins Quaker Oats Sales Staff

The Chemicals Department of the Quaker Oats Company announces the appointment of William A. Webster to take charge of nation-wide sales of furfural residue. His headquarters will be in the Board of Trade Building, Chicago, Ill.

Mr. Webster is well known in the fertilizer trade after 13 years as divisional sales manager with the Chilean Nitrate Sales Corporation and 6 years with American Potash and Chemical Corporation in a similar capacity. He is a graduate of Yale, 1928.

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BEE"**

FERTILIZER GRINDER

"Jay Bee" grinds every grindable fertilizer ingredient coarse or fine, cool and uniform.

All steel construction—heavy cast iron base. Practically indestructible. Biggest capacity for H.P. used. Handles products with up to 14% grease—30% moisture. Delivers finished products to storage bins without screens or elevators. Sizes and styles from 20 H.P. to 200 H.P. to meet every grinding requirement.

Write for complete details. Please state your grinding requirements.

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Franklin, Tenn.





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WITH
**Bemis
Multiwall
Bags**

There's extra value you don't see in the bag itself. It shows up in your plant, where Bemis specialists will check your filling, closing and storage operations to make sure you're getting the most from your equipment. There's extra benefit, too, in having Bemis Multiwall Plants conveniently located to take care of your needs. We invite you to take advantage of these services.

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It pays to have "The Bemis Habit"

More than meets the

Eye

WITH

Bemis
COTTON
BAGS

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BAGS

There's extra value in the service you get from "America's No. 1 Bag Maker"—the skill of experienced workmen and the close contact with conveniently located plants and offices. Feel free to draw on the facilities and the experience of the Bemis organization. Perhaps you have some questions now about fertilizer packaging and shipping. Just drop us a line.

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"There's More
Nitrogen Economy
In Fertilizers Mixed
with

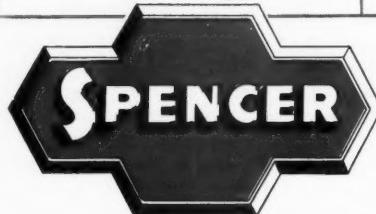
SPENSOL™
SPENCER NITROGEN SOLUTIONS

You Get All 4 of These Extra-
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- 1 MORE NITROGEN PER DOLLAR. Makes Spensol your best and most economical source of nitrogen for efficient, more profitable fertilizer mixing.
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- 4 IMMEDIATE AVAILABILITY. Ready for shipment in tank car lots direct from centrally-located Jayhawk Works at Pittsburg, Kansas. Our technical advisory staff is at your service, without charge.

COMPOSITION OF SPENSOL (SPENCER NITROGEN SOLUTIONS)

	Ammonium Nitrate %	Anhydrous Ammonia %	Water %	Total Nitrogen %	Nitrate Nitrogen %	Ammonia Nitrogen %
SPENSOL A	65.0	21.7	13.3	40.6	11.36	29.24
SPENSOL B	55.5	26.0	18.5	40.8	9.62	31.18
SPENSOL C	66.8	16.6	16.6	37.0	11.65	25.35



**SPENCER
CHEMICAL COMPANY**

Executive and Sales Offices: Dwight Building, Kansas City 6, Mo.
Works: Pittsburg, Kansas

MANUFACTURERS OF HI-NITROGEN AGRICULTURAL PRODUCTS

Whittington Joins American Potash Staff

Announcement has just been made that Joseph S. Whittington has joined American Potash and Chemical Corporation as manager of sodium sulphate sales. He will be located at the New York office of the company. Mr. Whittington was formerly with F. W. Berk and Company, Inc., and has a wide circle of friends in the fertilizer industry.

Nitrogen Steps-up Indiana Corn Crop Yields

Corn crops with producing ability limited by nitrogen supplies, during the last 3 years in Purdue University Experimental field tests, have shown increases ranging from 10 to 40 bushels per acre when supplied with nitrogen either in organic or commercial forms.

On "hard run" soils, the average increase for the 3 three years for 80 pounds of elemental nitrogen plowed down has been 20 bushels per acre, although in years of abundant moisture supply, the increase has been 40 bushels per acre.

Rotations have been helpful in stepping up yields, with excellent results from only fair stands of sweet clover plowed down for corn, and sensational increases from heavy sweet clover stands. In 1946 tests, sweet clover sod gave as much corn per acre as heavily nitrated soil, but commercial nitrogen, in addition to sweet clover, still further increased the yields.

Farmers on the field day tour saw the 1947 results, learned to recognize nitrogen deficiency symptoms often attributed to dry weather, and learned how to use nitrogen effectively on corn on top of basic mineral treatments.

More French Superphosphate

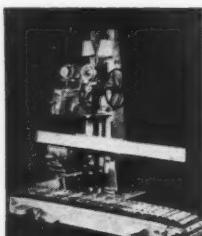
Reports from Paris indicate that the French superphosphate industry is making strides to supply greater quantities of this fertilizer so much needed by European agriculture. In 1938, prior to World War II, the industry had an average monthly production of 114,000 tons. In May, 1947, 115,000 tons were produced. This figure increased to 124,000 tons in June, while July showed a further small increase to 125,000 tons.

*Here's a tough, safe
stitch - and
it's easy to open!*

A man wearing a fedora hat is shown next to a speech bubble containing the text above. To the left of the man is a small illustration of a zigzagged stitched bag.

Most farmers agree that you can't beat the BAGPAK "cushion-stitch" closure (made by Model E-1 Bagpaker illustrated) for closing heavy-duty multiwall paper bags. This "cushion stitch" is tough; in fact, it is the strongest part of the bag. Yet it opens neatly, in a flash!—no necessity to cut and hack at each stitch.

The "cushion stitch" makes your packaged fertilizer a better seller. Economical to apply. Write Bagpak for details.



BAGPAKER E-1 (Portable).
Working with filled bags,
one operator can close up to
15 bags per minute. A single
foot pedal controls both con-
veyor and sewing head.



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THREE ELEPHANT



Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of your local County Agent or State Experimental Stations.



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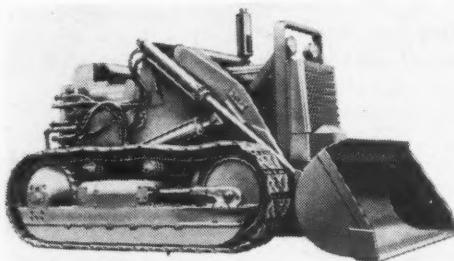
"Pioneer Producers of Muriate in America"

D-3

New 2-Yard Hough Bulldozer-Shovel

A new, larger, more powerful bulldozer-shovel has just been announced by the Frank G. Hough Company of Libertyville, Illinois. Designed into the International TD-14 Diesel Tractor, the Model 14 Bulldozer-Shovel incorporates many new exclusive features, found in no other unit in the 2-yard class.

A large capacity, front mounted hydraulic pump, directly connected to the engine crankshaft, supplies power for all operations. By means of a single lever the operator can raise, lower, hold or "float" the bucket, or



The Hough Model 14 Bulldozer-Shovel

apply down pressure when hard digging is encountered. In addition the bucket may be dumped partially or completely at any height and returned by hydraulic power.

An automatic bucket tip-back tilts the bucket back 38 degrees in carrying position to prevent spillage. The tracks are not tied down, but oscillate freely, to conform to ground contour, as in normal tractor operation. Front end superstructures are entirely

eliminated providing the operator with complete visibility in every direction. The bucket extends the full track width of the tractor, to permit excavation close to walls, embankments and slopes.

A fill track width bulldozer blade can be attached in a matter of minutes, enabling the bulldozer-shovel to handle a wide variety of bulldozing jobs consistent with the size of the tractor.

Hough bulldozer-shovels are also available in the 1-yard size.

Ohio Farmers Set Record in Buying Fertilizer

Ohio farmers paid out at least \$17,500,000 for fertilizer in the 6 months from January 1 to June 30, 1947, for a total of 457,574 tons of commercial plant-food carriers. Earl Jones, extension agronomist, Ohio State University, says the 1947 total is the highest on record for the 6-month period.

Laying out many millions of dollars in 6 months for just one part of Ohio's soil improvement program seems like a heavy addition to farm production costs, but Mr. Jones points out the money spent averages about \$80 per farm or \$1.50 per acre for Ohio's cropland. An extra bushel of grain per acre at 1947 prices more than pays for fertilizer applied at that rate.

This University agronomist says the records supplied by Ohio fertilizer selling agencies show farmers continue to prefer the better grades of fertilizer. The list of sales includes 1,353 tons of 4-24-12 fertilizer, which contains 40 per cent plant food. The most popular fertilizer analysis in Ohio this spring was 2-12-6. Farmers bought 272,047 tons of that one analysis.

JAITE

HEAVY DUTY MULTI-WALL PAPER BAGS

OFFER DEPENDABLE PROTECTION FOR
YOUR FERTILIZER

THE JAITE COMPANY

"Manufacturers of Paper and Paper Bags"

JAITE, OHIO



FOR RICHER HARVESTS

Today's swelling tide of American farm production is accompanied by an ever-growing realization of the necessity of the proper enrichment of the land through the sound use of fertilizers. Many of the most efficient of these fertilizers are compounded with Potash. For Potash renews the life of the land, builds up a greater resistance to disease and drought, insures healthful crops . . . and sturdy flocks.

Sunshine State Potash is an important factor in the continued advance of American farming.



HIGRAGE MURIATE OF POTASH

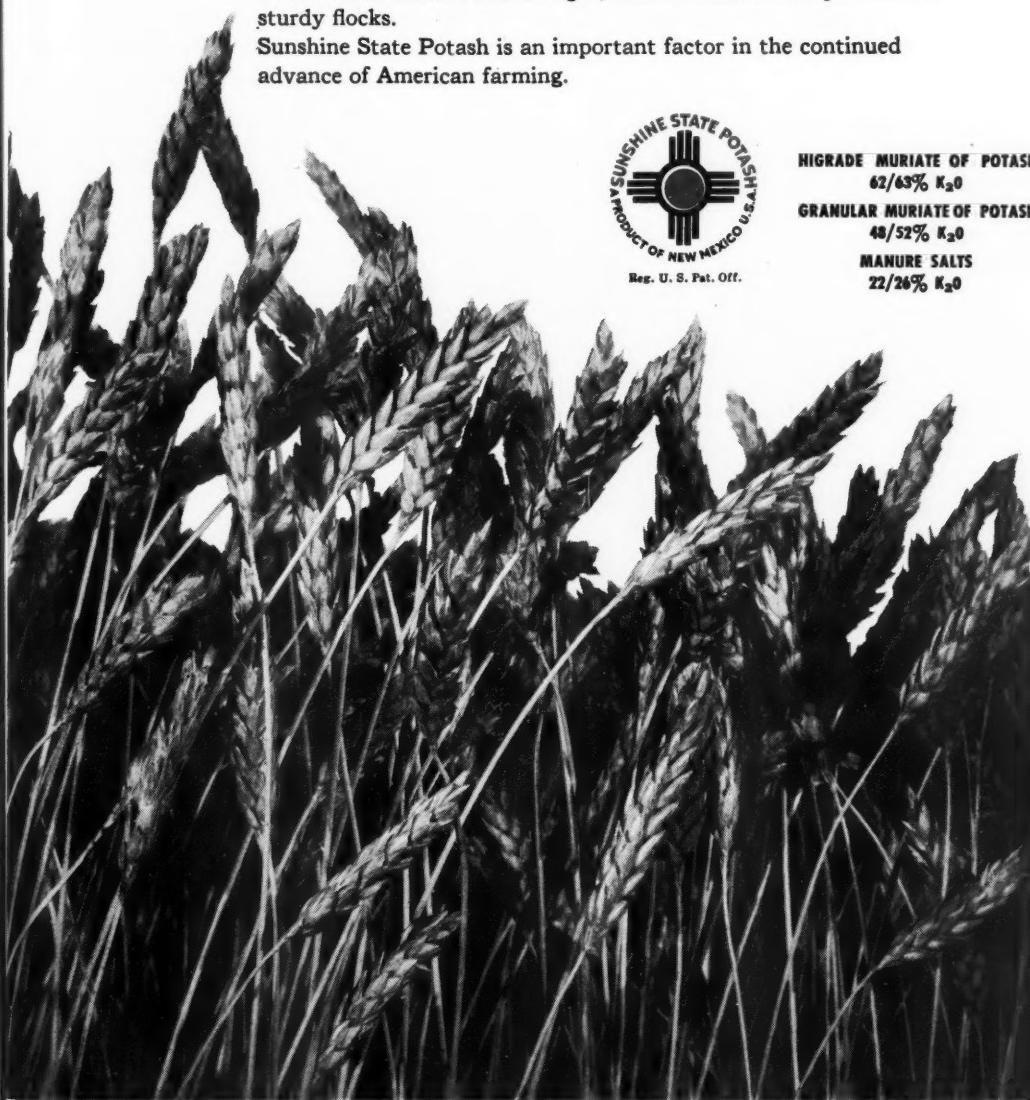
62/63% K₂O

GRANULAR MURIATE OF POTASH

48/52% K₂O

MANURE SALTS

22/26% K₂O



UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

Mr. Jones says Ohio farmers for the past few years have been buying almost as much fertilizer in the last 6 months of the year as in the first half so their 1947 expenses for fertilizer will run well above \$30,000,000.

New Cal-Nitro Prices

On September 17th, the Synthetic Nitrogen Products Corporation announced an increase in the price of Cal-Nitro, containing 20.5 per cent nitrogen. The new price, effective on shipments beginning October 1st, is \$33.50 per ton in bulk and \$37.50 per ton in 100 lb. paper bags. Both prices are f.o.b. Hopewell, Va.

Fertilizers for Pastures in Mississippi

Pasture fertilizer experiments conducted at the Raymond branch of the Mississippi Agricultural Experiment Station are reported in the 59th annual report of the station. The tests were made on an established stand of Dallis grass, spring clovers (hop, white and Persian) and common lespedeza grown on Olivier soils.

Lime alone gave an increase over check of only 900 pounds. Colloidal phosphate alone increased the yield 1,000 pounds per acre. Basic slag, applied at the rate of 1,000 pounds per acre, produced an increase of 2,900 pounds more than a 500-pound application.

The report states: "The addition of potash further increased the yield 1,500 pounds and gave a total yield of 15,000 pounds of green weight per acre per year.

"All fertilizer rates and combinations show that applications of potash, equivalent to 60 pounds of muriate per acre per year, are needed for maximum yields."

Winter Legumes Versus Commercial Nitrogen

A test started several years ago at the Raymond branch of the Mississippi Agricultural Experiment Station consists of a comparison of 400 pounds of 6-8-8 complete fertilizer with an 0-8-8 plus hairy vetch and 0-8-8 plus wild winter peas. The station reports: "The 6-8-8 commercial fertilizer has produced the highest yields," but adds that good yields have been obtained from the mineral-plus-legume plots.

Sugar Beets Benefited by Fertilizers

A need for greater applications of nitrogen and phosphorus on Wyoming sugar beet fields has been reported by T. J. Dunnewald of the State experiment station. Dunnewald, who has just completed a tour of demonstration fields of fertilized beets in Northern and Eastern Wyoming, said the appearance of all fields indicated large yield increases from application of the two fertilizers.

Demonstration plots are located near Powell, Lovell, Basin, Cowley, and Wheatland. They are planted on the farms of cooperating growers in these areas, with the fertilizer provided by a commercial sugar beet company.

Nitrogen, he said, has given larger and greener beet tops in the demonstration fields. Phosphate applications gave noticeable improvement only on fields of low fertility, but nitrogen and phosphorus in combination, he pointed out, gave better results than either alone, and the combination gave excellent results on fields already having a high level of fertility.

Dunnewald noted that large applications of 450 to 600 pounds of fertilizer to the acre gave better results than small applications.

LONGVIEW

Lime Products

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SYMPOSIUM ON CALCIUM IN AGRICULTURE

(Continued from page 9)

trode potentials, ionization potentials, and the solubility of different nutrient compounds are very useful in the consideration of the availability of different nutrients. The energy properties of nutrients are of particular interest. The release of the exchangeable cations from colloidal complexes and the intensity of their absorption by plants are apparently definitely correlated with the ionization potentials and the standard electrode potentials of the metallic nutrients.

The intensity factor of energy, as reflected in the relative strength of ions, is usually more significant than the quantity or capacity factor, as expressed in ion concentration, in determining the availability of metallic soil nutrients to certain plants.

Available Calcium Supply in Poorly Buffered Soils

I. E. Miles

Comparatively small amounts of lime are used in the upper coastal plains of North Carolina. To be sure, the type of crop involved is a factor, but there are a number of physiological as well as economic reasons to support this practice. In the first place, the exchange capacity of the soils of this area will perhaps not exceed 3.0 M. E. per 100 grams of soil. In the second place, the organic phase of the exchange complex accounts for the major portion of the exchange capacity. Third, the mineral colloid involved is largely of the kaolinitic, or 1:1, type. All three of these factors very actively contribute to the use by the plant of a large proportional part of the calcium present.

With a low exchange capacity, relatively small amounts of calcium are required to effect the desired degree of saturation. Furthermore, the calcium held by an organic colloid is perhaps released with less energy required than most other types of colloid, and the complementary colloid involved, largely kaolinitic, would rate second place in this category. The kaolinitic colloid actually requires only 50 to 60 per cent saturation to

supply the calcium needed for crops, other than those that have extremely high calcium requirements like alfalfa and sweet clover. Therefore, it is believed that perhaps no important soil area of the United States uses calcium with greater efficiency than the low exchange capacity or poorly buffered soils of the upper coastal plains.

Soluble Sources of Calcium in Plant Growth

J. F. Reed and R. W. Cummings

The effects of calcium as a nutrient element in plant growth are discussed. The results of various investigations on additions of soluble calcium, particularly as compared with lime applications, are given. The application of calcium salts on various crops is reviewed. Data are presented from recent experiments involving the use of calcium sulphate on peanuts. Peanuts require calcium in the soil area in which the peanut fruit is formed. The required level of calcium in this zone is largely independent of the calcium supply in the rooting zone. Calcium is usually applied to the soil in a soluble form when the peanuts are beginning to fruit. The effect of such factors as variety of peanuts and type of soil colloid is emphasized. Comparisons are given between the use of lime and calcium sulphate as sources of calcium for peanuts.

The Relation of Calcium to the Availability and Absorption of Certain Trace Elements by Plants

E. R. Purvis and O. W. Davidson

Calcium serves an important role in regulating the absorption of all nutrients by plant roots. Salts of calcium which affect the soil reaction greatly influence the availability to plants of most of the trace elements. Iron and manganese become decreasingly available to plants as the soil reaction increases above pH 6.5. Heavy liming on some soils may produce boron deficiency. The availability of copper and zinc may be similarly affected. Soluble aluminum becomes negligible in the soil solution between the approximate range of pH 5.0 and 8.0.

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			WATER %	NITRATE %	AMMONIA %	TOTAL
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NITROGEN SOLUTION...2	55.5	26.0	18.5	9.71	31.10	40.8
NITROGEN SOLUTION...3	66.8	16.6	16.6	11.69	25.34	37.0

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Since there is no single reaction at which all nutrients are equally available to plants, it is perhaps fortunate that the medium surrounding the roots of plants is usually variable in pH, due to the excretion of roots, acids formed in the decomposition of mineral and organic materials, liming, and other factors. When this medium becomes constant in reaction, deficiency symptoms of one or more plant nutrients are likely to appear.

Calcium Content of Soils and Fertilizers in Relation to Composition and Nutritive Value of Plants

G. E. Smith and J. B. Hester

Failure to consider soil fertility and soil properties has made the influence of lime and calcium-bearing materials on plant composition a controversial issue. Only under some soil conditions will addition of calcium to a soil increase the calcium content of plants.

It is generally agreed that plants from soils very low in available calcium may cause nutritional disorders when used as feed. However, animal nutritionists frequently dismiss any increase in calcium content of plants through soil treatments as being of minor importance since the ration may be cheaply fortified by the addition of inorganic compounds. Recent investigations, however, show that the addition of calcium to a soil influences the availability and absorption of other elements, which in turn alters the physiological processes and the synthesis of organic compounds within a plant. Such plants furnish entirely different food for humans or animals than the same plant species from untreated soil when fortified with inorganic calcium salts.

Evidence continues to accumulate that animals can detect differences in plant composition that are not evident from routine mineral

analyses. There is an increasing amount of information that animal well-being and the composition of animal products are closely associated with those soils that furnish a balanced supply of nutrients. There is need for a re-examination of soil-plant-animal relationships that begins with a study of soil properties and soil fertility balance, changes in availability of other minerals as influenced by liming, changes in plant composition, and finally the effect on growth and reproduction of animals consuming these plant materials.

AUGUST TAG SALES

(Continued from page 00)

diana, Kentucky, and Kansas, were higher than for a year ago, with Kansas reporting the greatest increase. Sales in Illinois and Missouri, the other two Midwestern States, were below those of last August; the decrease for Illinois was the greater.

Fertilizer tax tags sold in the 16 States from January through August, amounting to 6,593,000 equivalent short tons, were less than one per cent below total sales for the same period last year, but 10 per cent above the 5,968,000 tons reported for January-August, 1945.

Cumulative sales in the 11 Southern States, totaling 5,263,000 tons, were 4 per cent below January-August, 1945. Tennessee, Arkansas, Texas, and Oklahoma showed increases, but the others showed decreases ranging from 1 to 16 per cent. Cumulative sales in the Midwestern States, on the other hand, increased 14 per cent above a year ago, with only Missouri failing to record a gain.

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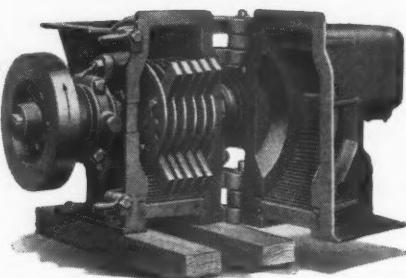
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Alphabetical List of Advertisers

American Agricultural Chemical Co., New York City	29
American Limestone Co., Knoxville, Tenn.	16
American Potash and Chemical Corp., New York City	21
Armour Fertilizer Works, Atlanta, Ga.	—
Ashcraft-Wilkinson Co., Atlanta, Ga.	Front Cover
Bagpak, Inc., New York City	20
Baker & Bro., H. J., New York City	—
Bemis Bro. Bag Co., St. Louis, Mo.	facing 18
Bradley Pulverizer Co., Allentown, Pa.	—
Chase Bag Co., Chicago, Ill.	—
Chemical Construction Corp., New York City	—
Commercial Solvents Corp., Dixie Chemical Div., Chicago, Ill.	2nd Cover
Exact Weight Scale Co., Columbus, Ohio	25
Fulton Bag & Cotton Mills, Atlanta, Ga.	6
Gascoyne & Co., Inc., Baltimore, Md.	34
Hayward Company, The, New York City	34
Hough Co., The Frank G., Libertyville, Ill.	—
Huber Co., L. W., New York City	28
International Minerals & Chemical Corporation, Chicago, Ill.	Back Cover
Jaite Company, The, Jaite, Ohio	22
Jackle, Frank R., New York City	14
Keener Mfg. Co., Lancaster, Pa.	34
Keim, Samuel D., Philadelphia, Pa.	33
Lion Oil Company, El Dorado, Ark.	27
Link-Belt Co., Chicago, Ill.	—
Longview-Saginaw Lime Works, Birmingham, Ala.	24
McIver & Son, Alex. M., Charleston, S. C.	30
Mente & Co., Inc., New Orleans, La.	4
Monarch Mfg. Works, Inc., Philadelphia, Pa.	34
Potash Co. of America, New York City	3rd Cover
Raymond Bag Co., Middletown, Ohio	17
Sackett & Sons Co., The A. J., Baltimore, Md.	—
Schmaltz, Jos. H., Chicago, Ill.	34
Schmutz Mfg. Co., Louisville, Ky.	5
Sedberry, Inc., J. B., Franklin, Tenn.	18
Shuey & Company, Inc., Savannah, Ga.	34
Southern States Phosphate & Fertilizer Co., Savannah, Ga.	26
Spencer Chemical Co., Kansas City, Mo.	19
Stedman's Foundry and Machine Works, Aurora, Ind.	28
St. Regis Paper Co., New York City	3
Sturtevant Mill Co., Boston, Mass.	30
Titlestad Corporation, Nicolay, New York City	—
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.	30
United States Potash Co., New York City	23
Utility Works, The, East Point, Ga.	—
Virginia-Carolina Chemical Corp., Richmond, Va.	—
Wiley & Company, Inc., Baltimore, Md.	34

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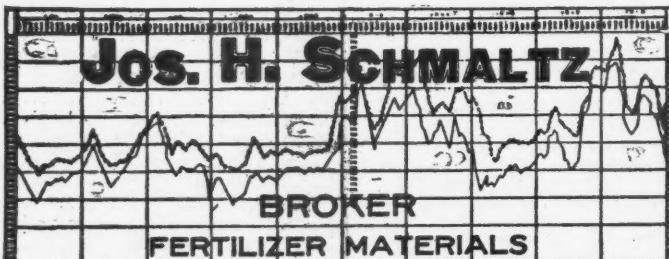
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